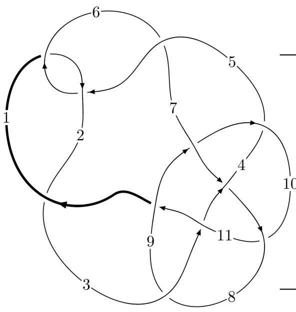
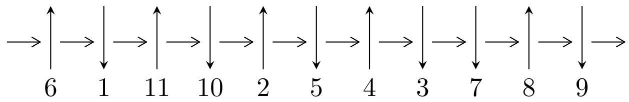
# $11a_{135}$ $(K11a_{135})$




A knot diagram[1]

**Linearized knot diagam**




**Solving Sequence**

$$1{,}6 \xrightarrow[c_1]{} 2 \xrightarrow[c_2]{} 3 \xrightarrow[c_5]{} 5 \xrightarrow[c_6]{} 7{,}9 \xrightarrow[c_8]{} 8 \xrightarrow[c_{11}]{} 11 \xrightarrow[c_3]{} 4 \xrightarrow[c_{10}]{} 10 \twoheadrightarrow c_4, c_7, c_9$$

**Ideals for irreducible components[2] of $X_{\mathbf{par}}$**

$$I_1^u = \langle -1271u^{35} + 7400u^{34} + \cdots + 559b + 6593,\ 1511u^{35} - 17846u^{34} + \cdots + 2236a - 43197,\ u^{36} - 6u^{35} + \cdots + u + 4\rangle$$

$$I_2^u = \langle -u^{26}a + 317u^{26} + \cdots + a + 1171,\ 4u^{26}a - 3u^{26} + \cdots - 6a + 9,\ u^{27} + 2u^{26} + \cdots - 4u^2 - 1\rangle$$

$$I_3^u = \langle -2u^9 + u^8 - 3u^7 + u^6 - 6u^5 + 4u^4 - 8u^3 + 5u^2 + b - 4u + 1,\ u^8 + u^7 + u^4 + u^3 - u^2 + a - 3,\ u^{10} - u^9 + 2u^8 - u^7 + 4u^6 - 3u^5 + 6u^4 - 4u^3 + 5u^2 - u + 1\rangle$$

$$I_4^u = \langle b + 1,\ a^2 - 2au - a - u - 2,\ u^2 + u + 1\rangle$$

* 4 irreducible components of $\dim_{\mathbb{C}} = 0$, with total 104 representations.

[1] The image of knot diagram is generated by the software "**Draw programme**" developed by Andrew Bartholomew(`http://www.layer8.co.uk/maths/draw/index.htm#Running-draw`), where we modified some parts for our purpose(`https://github.com/CATsTAILs/LinksPainter`).

[2] All coefficients of polynomials are rational numbers. But the coefficients are sometimes approximated in decimal forms when there is not enough margin.

**I.** $\boldsymbol{I_1^u = \langle -1271u^{35} + 7400u^{34} + \cdots + 559b + 6593,\ 1511u^{35} - 17846u^{34} + \cdots + 2236a - 43197,\ u^{36} - 6u^{35} + \cdots + u + 4\rangle}$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u^2 + 1 \\ -u^2 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -u \\ u^3 + u \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -u^3 \\ u^5 + u^3 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} -0.675760u^{35} + 7.98122u^{34} + \cdots + 27.4079u + 19.3189 \\ 2.27370u^{35} - 13.2379u^{34} + \cdots - 13.8336u - 11.7943 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} -5.13551u^{35} + 22.9168u^{34} + \cdots - 13.4794u + 0.555009 \\ 11.4633u^{35} - 59.1413u^{34} + \cdots + 2.49732u - 22.1485 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 2.05322u^{35} - 7.18515u^{34} + \cdots + 17.4490u + 7.42889 \\ -0.159213u^{35} + 0.654741u^{34} + \cdots - 7.64580u - 1.40072 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} -4.34571u^{35} + 24.2531u^{34} + \cdots + 1.93202u + 12.1552 \\ 1.29875u^{35} - 5.67800u^{34} + \cdots + 5.43649u + 1.81932 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 5.53712u^{35} - 21.7594u^{34} + \cdots + 26.2039u + 8.03444 \\ -7.89624u^{35} + 42.0340u^{34} + \cdots + 5.69052u + 20.5420 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} 5.53712u^{35} - 21.7594u^{34} + \cdots + 26.2039u + 8.03444 \\ -7.89624u^{35} + 42.0340u^{34} + \cdots + 5.69052u + 20.5420 \end{pmatrix}$$

**(ii) Obstruction class** $= -1$

**(iii) Cusp Shapes** $= \frac{4133}{559}u^{35} - \frac{18240}{559}u^{34} + \cdots + \frac{10119}{559}u - \frac{3554}{559}$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $u^{36} - 6u^{35} + \cdots + u + 4$ |
| $c_2, c_6$ | $u^{36} + 10u^{35} + \cdots + 31u + 16$ |
| $c_3, c_7$ | $u^{36} + 2u^{35} + \cdots + 2u + 1$ |
| $c_4, c_8$ | $u^{36} + 6u^{34} + \cdots - 5u + 2$ |
| $c_9, c_{11}$ | $u^{36} + 6u^{35} + \cdots + 4u + 1$ |
| $c_{10}$ | $u^{36} + 19u^{35} + \cdots + u + 2$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $y^{36} + 10y^{35} + \cdots + 31y + 16$ |
| $c_2, c_6$ | $y^{36} + 34y^{35} + \cdots - 6849y + 256$ |
| $c_3, c_7$ | $y^{36} + 24y^{35} + \cdots + 44y + 1$ |
| $c_4, c_8$ | $y^{36} + 12y^{35} + \cdots + 27y + 4$ |
| $c_9, c_{11}$ | $y^{36} - 8y^{35} + \cdots + 28y + 1$ |
| $c_{10}$ | $y^{36} - y^{35} + \cdots + 67y + 4$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.276741 + 0.944175I$<br>$a = -1.25934 + 0.87235I$<br>$b = -1.18704 - 0.84945I$ | $-3.77194 - 4.33449I$ | $-10.34773 + 8.70742I$ |
| $u = -0.276741 - 0.944175I$<br>$a = -1.25934 - 0.87235I$<br>$b = -1.18704 + 0.84945I$ | $-3.77194 + 4.33449I$ | $-10.34773 - 8.70742I$ |
| $u = -0.304491 + 0.889790I$<br>$a = -0.062800 + 1.255710I$<br>$b = -1.142480 + 0.222558I$ | $-3.69796 - 0.78585I$ | $-10.32257 + 1.08257I$ |
| $u = -0.304491 - 0.889790I$<br>$a = -0.062800 - 1.255710I$<br>$b = -1.142480 - 0.222558I$ | $-3.69796 + 0.78585I$ | $-10.32257 - 1.08257I$ |
| $u = 0.700901 + 0.854931I$<br>$a = 0.21075 - 1.52850I$<br>$b = -0.322329 + 0.571982I$ | $0.84484 + 3.07899I$ | $-2.36753 - 4.61435I$ |
| $u = 0.700901 - 0.854931I$<br>$a = 0.21075 + 1.52850I$<br>$b = -0.322329 - 0.571982I$ | $0.84484 - 3.07899I$ | $-2.36753 + 4.61435I$ |
| $u = 0.670636 + 0.904481I$<br>$a = 0.853772 + 0.895928I$<br>$b = -0.023486 - 0.449791I$ | $0.69868 + 2.21160I$ | $-2.61972 - 2.06632I$ |
| $u = 0.670636 - 0.904481I$<br>$a = 0.853772 - 0.895928I$<br>$b = -0.023486 + 0.449791I$ | $0.69868 - 2.21160I$ | $-2.61972 + 2.06632I$ |
| $u = -0.848515 + 0.073137I$<br>$a = -0.708084 + 0.620130I$<br>$b = 0.741423 - 0.831359I$ | $1.04891 + 7.93873I$ | $2.26099 - 7.53856I$ |
| $u = -0.848515 - 0.073137I$<br>$a = -0.708084 - 0.620130I$<br>$b = 0.741423 + 0.831359I$ | $1.04891 - 7.93873I$ | $2.26099 + 7.53856I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.335316 + 1.103160I$<br>$a = 0.986796 - 0.482008I$<br>$b = 1.076210 + 0.827984I$ | $-2.43737 - 11.97940I$ | $-3.58846 + 9.69532I$ |
| $u = -0.335316 - 1.103160I$<br>$a = 0.986796 + 0.482008I$<br>$b = 1.076210 - 0.827984I$ | $-2.43737 + 11.97940I$ | $-3.58846 - 9.69532I$ |
| $u = -0.754047 + 0.880053I$<br>$a = 0.256067 + 0.953865I$<br>$b = -1.57066 + 0.07535I$ | $1.51994 - 2.85709I$ | $-2.33106 + 2.86602I$ |
| $u = -0.754047 - 0.880053I$<br>$a = 0.256067 - 0.953865I$<br>$b = -1.57066 - 0.07535I$ | $1.51994 + 2.85709I$ | $-2.33106 - 2.86602I$ |
| $u = 0.836947 + 0.813811I$<br>$a = 1.45743 + 1.45510I$<br>$b = -0.90494 - 1.42986I$ | $3.28088 - 2.39771I$ | $-4.49853 + 2.73594I$ |
| $u = 0.836947 - 0.813811I$<br>$a = 1.45743 - 1.45510I$<br>$b = -0.90494 + 1.42986I$ | $3.28088 + 2.39771I$ | $-4.49853 - 2.73594I$ |
| $u = -0.185132 + 1.158740I$<br>$a = 0.116551 - 0.668626I$<br>$b = 0.655109 - 0.395481I$ | $-3.33480 + 4.43993I$ | $-6.66340 - 7.47745I$ |
| $u = -0.185132 - 1.158740I$<br>$a = 0.116551 + 0.668626I$<br>$b = 0.655109 + 0.395481I$ | $-3.33480 - 4.43993I$ | $-6.66340 + 7.47745I$ |
| $u = 0.911501 + 0.758905I$<br>$a = -1.10120 - 1.05489I$<br>$b = 1.12689 + 1.25578I$ | $5.92417 - 11.34300I$ | $2.20430 + 5.55458I$ |
| $u = 0.911501 - 0.758905I$<br>$a = -1.10120 + 1.05489I$<br>$b = 1.12689 - 1.25578I$ | $5.92417 + 11.34300I$ | $2.20430 - 5.55458I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.824017 + 0.898169I$<br>$a = -0.177149 - 0.497820I$<br>$b = 0.921405 - 0.086126I$ | $6.48061 - 3.07379I$ | $6.45709 + 2.41299I$ |
| $u = -0.824017 - 0.898169I$<br>$a = -0.177149 + 0.497820I$<br>$b = 0.921405 + 0.086126I$ | $6.48061 + 3.07379I$ | $6.45709 - 2.41299I$ |
| $u = 0.021281 + 0.766965I$<br>$a = -1.40357 + 1.58774I$<br>$b = -1.045680 - 0.299865I$ | $-2.80406 + 0.04358I$ | $-9.18489 + 0.34635I$ |
| $u = 0.021281 - 0.766965I$<br>$a = -1.40357 - 1.58774I$<br>$b = -1.045680 + 0.299865I$ | $-2.80406 - 0.04358I$ | $-9.18489 - 0.34635I$ |
| $u = 0.789000 + 0.963507I$<br>$a = -0.51131 - 2.47418I$<br>$b = -1.06736 + 1.45192I$ | $2.81727 + 8.47181I$ | $-5.83967 - 8.29612I$ |
| $u = 0.789000 - 0.963507I$<br>$a = -0.51131 + 2.47418I$<br>$b = -1.06736 - 1.45192I$ | $2.81727 - 8.47181I$ | $-5.83967 + 8.29612I$ |
| $u = 0.374008 + 0.626804I$<br>$a = 0.891587 - 0.075576I$<br>$b = 0.070132 + 0.290278I$ | $0.10177 + 1.47413I$ | $1.25501 - 4.83821I$ |
| $u = 0.374008 - 0.626804I$<br>$a = 0.891587 + 0.075576I$<br>$b = 0.070132 - 0.290278I$ | $0.10177 - 1.47413I$ | $1.25501 + 4.83821I$ |
| $u = 1.028740 + 0.773325I$<br>$a = 0.187909 + 0.308356I$<br>$b = -0.190982 - 0.521409I$ | $4.99883 + 3.21347I$ | $19.6525 + 3.8446I$ |
| $u = 1.028740 - 0.773325I$<br>$a = 0.187909 - 0.308356I$<br>$b = -0.190982 + 0.521409I$ | $4.99883 - 3.21347I$ | $19.6525 - 3.8446I$ |

| Solutions to $I_1^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.798120 + 1.025270I$<br>$a = 0.57651 + 2.10645I$<br>$b = 1.23838 - 1.24673I$ | $5.0855 + 17.6564I$ | $0.86604 - 10.01914I$ |
| $u = 0.798120 - 1.025270I$<br>$a = 0.57651 - 2.10645I$<br>$b = 1.23838 + 1.24673I$ | $5.0855 - 17.6564I$ | $0.86604 + 10.01914I$ |
| $u = 0.880565 + 1.020470I$<br>$a = 0.032721 - 0.717303I$<br>$b = -0.616024 + 0.418194I$ | $4.23977 + 3.68667I$ | $0. - 11.71183I$ |
| $u = 0.880565 - 1.020470I$<br>$a = 0.032721 + 0.717303I$<br>$b = -0.616024 - 0.418194I$ | $4.23977 - 3.68667I$ | $0. + 11.71183I$ |
| $u = -0.483436 + 0.080826I$<br>$a = 1.52835 - 0.78222I$<br>$b = -0.758556 + 0.609588I$ | $-1.25585 + 1.57291I$ | $-2.37601 - 4.05394I$ |
| $u = -0.483436 - 0.080826I$<br>$a = 1.52835 + 0.78222I$<br>$b = -0.758556 - 0.609588I$ | $-1.25585 - 1.57291I$ | $-2.37601 + 4.05394I$ |

**II. $I_2^u = \langle -u^{26}a + 317u^{26} + \cdots + a + 1171,\ 4u^{26}a - 3u^{26} + \cdots - 6a + 9,\ u^{27} + 2u^{26} + \cdots - 4u^2 - 1\rangle$**

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$a_6 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$

$$a_2 = \begin{pmatrix} 1 \\ -u^2 \end{pmatrix}$$

$$a_3 = \begin{pmatrix} u^2 + 1 \\ -u^2 \end{pmatrix}$$

$$a_5 = \begin{pmatrix} -u \\ u^3 + u \end{pmatrix}$$

$$a_7 = \begin{pmatrix} -u^3 \\ u^5 + u^3 + u \end{pmatrix}$$

$$a_9 = \begin{pmatrix} a \\ 0.00201613au^{26} - 0.639113u^{26} + \cdots - 0.00201613a - 2.36089 \end{pmatrix}$$

$$a_8 = \begin{pmatrix} 0.00806452au^{26} - 1.55645u^{26} + \cdots + 0.991935a + 0.556452 \\ -0.00201613au^{26} - 0.360887u^{26} + \cdots + 0.00201613a - 3.63911 \end{pmatrix}$$

$$a_{11} = \begin{pmatrix} 0.360887au^{26} + 2.59879u^{26} + \cdots + 0.639113a + 0.401210 \\ 0.917339au^{26} - 0.796371u^{26} + \cdots - 0.917339a + 3.79637 \end{pmatrix}$$

$$a_4 = \begin{pmatrix} 1.08266au^{26} - 3.20363u^{26} + \cdots - 0.0826613a + 2.20363 \\ -0.0524194au^{26} - 0.383065u^{26} + \cdots + 1.05242a + 1.38306 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -0.00201613au^{26} - 0.360887u^{26} + \cdots + 1.00202a + 0.360887 \\ 0.00806452au^{26} + 0.443548u^{26} + \cdots - 0.00806452a - 3.44355 \end{pmatrix}$$

$$a_{10} = \begin{pmatrix} -0.00201613au^{26} - 0.360887u^{26} + \cdots + 1.00202a + 0.360887 \\ 0.00806452au^{26} + 0.443548u^{26} + \cdots - 0.00806452a - 3.44355 \end{pmatrix}$$

**(ii) Obstruction class** $= -1$

**(iii) Cusp Shapes**
$= 3u^{26} + 5u^{24} - u^{23} + 18u^{22} - 8u^{21} + 17u^{20} - 8u^{19} + 27u^{18} - 30u^{17} + 9u^{16} + 2u^{15} - 8u^{14} - 4u^{13} - 14u^{12} + 64u^{11} - 52u^{10} + 70u^9 - 24u^8 + 71u^7 - 52u^6 + 46u^5 - 25u^4 + 2u^3 - 11u^2 + 2u + 3$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $(u^{27} + 2u^{26} + \cdots - 4u^2 - 1)^2$ |
| $c_2, c_6$ | $(u^{27} + 8u^{26} + \cdots - 8u - 1)^2$ |
| $c_3, c_7$ | $u^{54} + 4u^{53} + \cdots + 9u + 2$ |
| $c_4, c_8$ | $u^{54} + 2u^{53} + \cdots - 1697u + 407$ |
| $c_9, c_{11}$ | $u^{54} - 5u^{53} + \cdots - 529u + 44$ |
| $c_{10}$ | $(u^{27} - 13u^{26} + \cdots - 10u + 4)^2$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $(y^{27} + 8y^{26} + \cdots - 8y - 1)^2$ |
| $c_2, c_6$ | $(y^{27} + 24y^{26} + \cdots - 12y - 1)^2$ |
| $c_3, c_7$ | $y^{54} - 8y^{53} + \cdots + 87y + 4$ |
| $c_4, c_8$ | $y^{54} + 12y^{53} + \cdots + 4226411y + 165649$ |
| $c_9, c_{11}$ | $y^{54} + 23y^{53} + \cdots + 25783y + 1936$ |
| $c_{10}$ | $(y^{27} - 5y^{26} + \cdots + 236y - 16)^2$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.144711 + 0.987236I$<br>$a = -1.044320 + 0.252570I$<br>$b = -1.10548 + 0.93118I$ | $-3.43692 + 4.10370I$ | $-10.33067 - 7.76154I$ |
| $u = 0.144711 + 0.987236I$<br>$a = 1.17591 + 1.35422I$<br>$b = 0.694713 - 0.161571I$ | $-3.43692 + 4.10370I$ | $-10.33067 - 7.76154I$ |
| $u = 0.144711 - 0.987236I$<br>$a = -1.044320 - 0.252570I$<br>$b = -1.10548 - 0.93118I$ | $-3.43692 - 4.10370I$ | $-10.33067 + 7.76154I$ |
| $u = 0.144711 - 0.987236I$<br>$a = 1.17591 - 1.35422I$<br>$b = 0.694713 + 0.161571I$ | $-3.43692 - 4.10370I$ | $-10.33067 + 7.76154I$ |
| $u = 0.504183 + 0.966350I$<br>$a = 0.867903 + 0.476539I$<br>$b = 0.929423 + 0.017439I$ | $-1.43447 + 1.57559I$ | $-0.45968 + 6.99556I$ |
| $u = 0.504183 + 0.966350I$<br>$a = 0.992670 - 0.899903I$<br>$b = -0.809221 - 0.348625I$ | $-1.43447 + 1.57559I$ | $-0.45968 + 6.99556I$ |
| $u = 0.504183 - 0.966350I$<br>$a = 0.867903 - 0.476539I$<br>$b = 0.929423 - 0.017439I$ | $-1.43447 - 1.57559I$ | $-0.45968 - 6.99556I$ |
| $u = 0.504183 - 0.966350I$<br>$a = 0.992670 + 0.899903I$<br>$b = -0.809221 + 0.348625I$ | $-1.43447 - 1.57559I$ | $-0.45968 - 6.99556I$ |
| $u = -0.770533 + 0.784290I$<br>$a = -0.44956 + 1.58387I$<br>$b = 0.151642 - 0.255883I$ | $2.45928 + 3.09185I$ | $-2.04409 - 4.31047I$ |
| $u = -0.770533 + 0.784290I$<br>$a = 1.53553 - 1.36774I$<br>$b = -1.00807 + 1.68610I$ | $2.45928 + 3.09185I$ | $-2.04409 - 4.31047I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.770533 - 0.784290I$<br>$a = -0.44956 - 1.58387I$<br>$b = 0.151642 + 0.255883I$ | $2.45928 - 3.09185I$ | $-2.04409 + 4.31047I$ |
| $u = -0.770533 - 0.784290I$<br>$a = 1.53553 + 1.36774I$<br>$b = -1.00807 - 1.68610I$ | $2.45928 - 3.09185I$ | $-2.04409 + 4.31047I$ |
| $u = 0.291946 + 1.107070I$<br>$a = 0.931124 + 0.230119I$<br>$b = 0.646966 - 0.516614I$ | $-0.60671 + 3.68820I$ | $4.86231 - 6.92207I$ |
| $u = 0.291946 + 1.107070I$<br>$a = -0.323787 + 0.014224I$<br>$b = -0.311394 + 0.647844I$ | $-0.60671 + 3.68820I$ | $4.86231 - 6.92207I$ |
| $u = 0.291946 - 1.107070I$<br>$a = 0.931124 - 0.230119I$<br>$b = 0.646966 + 0.516614I$ | $-0.60671 - 3.68820I$ | $4.86231 + 6.92207I$ |
| $u = 0.291946 - 1.107070I$<br>$a = -0.323787 - 0.014224I$<br>$b = -0.311394 - 0.647844I$ | $-0.60671 - 3.68820I$ | $4.86231 + 6.92207I$ |
| $u = -0.898179 + 0.746104I$<br>$a = -0.594838 + 0.861512I$<br>$b = 0.874324 - 0.984284I$ | $7.41344 + 3.23384I$ | $5.98510 - 2.95350I$ |
| $u = -0.898179 + 0.746104I$<br>$a = 0.595344 - 1.207400I$<br>$b = -0.349108 + 1.259600I$ | $7.41344 + 3.23384I$ | $5.98510 - 2.95350I$ |
| $u = -0.898179 - 0.746104I$<br>$a = -0.594838 - 0.861512I$<br>$b = 0.874324 + 0.984284I$ | $7.41344 - 3.23384I$ | $5.98510 + 2.95350I$ |
| $u = -0.898179 - 0.746104I$<br>$a = 0.595344 + 1.207400I$<br>$b = -0.349108 - 1.259600I$ | $7.41344 - 3.23384I$ | $5.98510 + 2.95350I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = 0.799598 + 0.863452I$<br>$a = 0.472052 + 1.331300I$<br>$b = -0.753138 - 1.063980I$ | $5.90777 - 1.53174I$ | $5.51904 + 2.02847I$ |
| $u = 0.799598 + 0.863452I$<br>$a = 0.53604 + 2.57871I$<br>$b = 1.21139 - 1.71770I$ | $5.90777 - 1.53174I$ | $5.51904 + 2.02847I$ |
| $u = 0.799598 - 0.863452I$<br>$a = 0.472052 - 1.331300I$<br>$b = -0.753138 + 1.063980I$ | $5.90777 + 1.53174I$ | $5.51904 - 2.02847I$ |
| $u = 0.799598 - 0.863452I$<br>$a = 0.53604 - 2.57871I$<br>$b = 1.21139 + 1.71770I$ | $5.90777 + 1.53174I$ | $5.51904 - 2.02847I$ |
| $u = 0.802525$<br>$a = 0.064178 + 0.713542I$<br>$b = 0.219481 - 0.777240I$ | 3.09479 | 9.01780 |
| $u = 0.802525$<br>$a = 0.064178 - 0.713542I$<br>$b = 0.219481 + 0.777240I$ | 3.09479 | 9.01780 |
| $u = 0.785462 + 0.911233I$<br>$a = -1.79873 - 1.10105I$<br>$b = 1.09759 + 1.87961I$ | $5.75923 + 7.48234I$ | $4.88411 - 7.87589I$ |
| $u = 0.785462 + 0.911233I$<br>$a = -1.04193 - 2.09558I$<br>$b = -0.810627 + 0.965025I$ | $5.75923 + 7.48234I$ | $4.88411 - 7.87589I$ |
| $u = 0.785462 - 0.911233I$<br>$a = -1.79873 + 1.10105I$<br>$b = 1.09759 - 1.87961I$ | $5.75923 - 7.48234I$ | $4.88411 + 7.87589I$ |
| $u = 0.785462 - 0.911233I$<br>$a = -1.04193 + 2.09558I$<br>$b = -0.810627 - 0.965025I$ | $5.75923 - 7.48234I$ | $4.88411 + 7.87589I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\text{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.740227 + 0.958313I$<br>$a = \quad 0.17325 - 1.77767I$<br>$b = \quad 0.279114 + 0.386141I$ | $1.92805 - 8.81809I$ | $-3.51760 + 9.35403I$ |
| $u = -0.740227 + 0.958313I$<br>$a = -0.83078 + 2.42491I$<br>$b = -1.23050 - 1.60076I$ | $1.92805 - 8.81809I$ | $-3.51760 + 9.35403I$ |
| $u = -0.740227 - 0.958313I$<br>$a = \quad 0.17325 + 1.77767I$<br>$b = \quad 0.279114 - 0.386141I$ | $1.92805 + 8.81809I$ | $-3.51760 - 9.35403I$ |
| $u = -0.740227 - 0.958313I$<br>$a = -0.83078 - 2.42491I$<br>$b = -1.23050 + 1.60076I$ | $1.92805 + 8.81809I$ | $-3.51760 - 9.35403I$ |
| $u = -0.818350 + 0.893459I$<br>$a = \quad 0.013291 - 1.076530I$<br>$b = \quad 1.005790 + 0.379819I$ | $6.46144 - 3.05379I$ | $5.97423 + 2.71426I$ |
| $u = -0.818350 + 0.893459I$<br>$a = -0.350459 + 0.093702I$<br>$b = \quad 0.789809 - 0.525186I$ | $6.46144 - 3.05379I$ | $5.97423 + 2.71426I$ |
| $u = -0.818350 - 0.893459I$<br>$a = \quad 0.013291 + 1.076530I$<br>$b = \quad 1.005790 - 0.379819I$ | $6.46144 + 3.05379I$ | $5.97423 - 2.71426I$ |
| $u = -0.818350 - 0.893459I$<br>$a = -0.350459 - 0.093702I$<br>$b = \quad 0.789809 + 0.525186I$ | $6.46144 + 3.05379I$ | $5.97423 - 2.71426I$ |
| $u = -0.194164 + 0.737666I$<br>$a = -0.1051250 - 0.0794208I$<br>$b = \quad 0.24714 - 1.64517I$ | $0.15408 - 4.76928I$ | $-1.41513 + 11.31767I$ |
| $u = -0.194164 + 0.737666I$<br>$a = -3.27600 - 0.27489I$<br>$b = -0.393595 - 0.629207I$ | $0.15408 - 4.76928I$ | $-1.41513 + 11.31767I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.194164 - 0.737666I$<br>$a = -0.1051250 + 0.0794208I$<br>$b = 0.24714 + 1.64517I$ | $0.15408 + 4.76928I$ | $-1.41513 - 11.31767I$ |
| $u = -0.194164 - 0.737666I$<br>$a = -3.27600 + 0.27489I$<br>$b = -0.393595 + 0.629207I$ | $0.15408 + 4.76928I$ | $-1.41513 - 11.31767I$ |
| $u = -0.786810 + 1.024740I$<br>$a = -0.87495 + 1.40397I$<br>$b = -0.499560 - 1.264320I$ | $6.54280 - 9.46925I$ | $4.33045 + 8.20563I$ |
| $u = -0.786810 + 1.024740I$<br>$a = 0.67436 - 1.65262I$<br>$b = 0.990241 + 0.929170I$ | $6.54280 - 9.46925I$ | $4.33045 + 8.20563I$ |
| $u = -0.786810 - 1.024740I$<br>$a = -0.87495 - 1.40397I$<br>$b = -0.499560 + 1.264320I$ | $6.54280 + 9.46925I$ | $4.33045 - 8.20563I$ |
| $u = -0.786810 - 1.024740I$<br>$a = 0.67436 + 1.65262I$<br>$b = 0.990241 - 0.929170I$ | $6.54280 + 9.46925I$ | $4.33045 - 8.20563I$ |
| $u = 0.522984 + 0.315101I$<br>$a = 0.220722 + 1.030080I$<br>$b = 0.852048 + 0.137605I$ | $0.23096 + 2.37565I$ | $1.69627 - 5.05605I$ |
| $u = 0.522984 + 0.315101I$<br>$a = 1.14627 - 0.90462I$<br>$b = -0.541670 + 0.765569I$ | $0.23096 + 2.37565I$ | $1.69627 - 5.05605I$ |
| $u = 0.522984 - 0.315101I$<br>$a = 0.220722 - 1.030080I$<br>$b = 0.852048 - 0.137605I$ | $0.23096 - 2.37565I$ | $1.69627 + 5.05605I$ |
| $u = 0.522984 - 0.315101I$<br>$a = 1.14627 + 0.90462I$<br>$b = -0.541670 - 0.765569I$ | $0.23096 - 2.37565I$ | $1.69627 + 5.05605I$ |

| Solutions to $I_2^u$ | $\sqrt{-1}(\mathrm{vol} + \sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.241884 + 0.503654I$<br>$a = 0.93986 - 1.89203I$<br>$b = -0.363999 + 1.059620I$ | $0.79481 + 2.83207I$ | $2.50674 + 1.28047I$ |
| $u = -0.241884 + 0.503654I$<br>$a = 2.35199 + 0.56436I$<br>$b = 0.686698 + 0.816102I$ | $0.79481 + 2.83207I$ | $2.50674 + 1.28047I$ |
| $u = -0.241884 - 0.503654I$<br>$a = 0.93986 + 1.89203I$<br>$b = -0.363999 - 1.059620I$ | $0.79481 - 2.83207I$ | $2.50674 - 1.28047I$ |
| $u = -0.241884 - 0.503654I$<br>$a = 2.35199 - 0.56436I$<br>$b = 0.686698 - 0.816102I$ | $0.79481 - 2.83207I$ | $2.50674 - 1.28047I$ |

**III.**
$$\boldsymbol{I_3^u = \langle -2u^9+u^8+\cdots+b+1,\ u^8+u^7+u^4+u^3-u^2+a-3,\ u^{10}-u^9+\cdots-u+1\rangle}$$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix}1\\0\end{pmatrix}$$
$$a_6 = \begin{pmatrix}0\\u\end{pmatrix}$$
$$a_2 = \begin{pmatrix}1\\-u^2\end{pmatrix}$$
$$a_3 = \begin{pmatrix}u^2+1\\-u^2\end{pmatrix}$$
$$a_5 = \begin{pmatrix}-u\\u^3+u\end{pmatrix}$$
$$a_7 = \begin{pmatrix}-u^3\\u^5+u^3+u\end{pmatrix}$$
$$a_9 = \begin{pmatrix}-u^8-u^7-u^4-u^3+u^2+3\\2u^9-u^8+3u^7-u^6+6u^5-4u^4+8u^3-5u^2+4u-1\end{pmatrix}$$
$$a_8 = \begin{pmatrix}u^9-u^8+u^7+3u^5-2u^4+3u^3-u^2+2u+2\\u^9-u^8+2u^7-u^6+4u^5-3u^4+6u^3-4u^2+4u-1\end{pmatrix}$$
$$a_{11} = \begin{pmatrix}-2u^9+2u^8-4u^7+2u^6-7u^5+7u^4-10u^3+9u^2-8u+3\\u^9+u^7+2u^5-u^4+2u^3-u^2+1\end{pmatrix}$$
$$a_4 = \begin{pmatrix}u^9-2u^8+2u^7-3u^6+3u^5-7u^4+6u^3-9u^2+4u-4\\-u^9+u^8-u^7+u^6-3u^5+3u^4-3u^3+3u^2-2u\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}u^9+u^7+u^6+3u^5+u^4+3u^3+2u^2+u+3\\-u^8+u^7-u^6+u^5-3u^4+3u^3-3u^2+3u-1\end{pmatrix}$$
$$a_{10} = \begin{pmatrix}u^9+u^7+u^6+3u^5+u^4+3u^3+2u^2+u+3\\-u^8+u^7-u^6+u^5-3u^4+3u^3-3u^2+3u-1\end{pmatrix}$$

**(ii) Obstruction class** $= 1$

**(iii) Cusp Shapes** $= -10u^9+6u^8-18u^7+6u^6-31u^5+20u^4-46u^3+26u^2-23u+4$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $u^{10} - u^9 + 2u^8 - u^7 + 4u^6 - 3u^5 + 6u^4 - 4u^3 + 5u^2 - u + 1$ |
| $c_2, c_6$ | $u^{10} + 3u^9 + \cdots + 9u + 1$ |
| $c_3, c_7$ | $u^{10} + u^8 + 2u^7 - u^5 + 3u^4 + u^3 - u^2 + 1$ |
| $c_4, c_8$ | $u^{10} - u^8 + u^7 + 3u^6 - u^5 + 2u^3 + u^2 + 1$ |
| $c_5$ | $u^{10} + u^9 + 2u^8 + u^7 + 4u^6 + 3u^5 + 6u^4 + 4u^3 + 5u^2 + u + 1$ |
| $c_9, c_{11}$ | $u^{10} + 2u^9 + 7u^8 + 7u^7 + 13u^6 + 5u^5 + 8u^4 - 2u^3 + u^2 - 2u + 1$ |
| $c_{10}$ | $u^{10} - 8u^9 + \cdots - 94u + 21$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $y^{10} + 3y^9 + \cdots + 9y + 1$ |
| $c_2, c_6$ | $y^{10} + 11y^9 + \cdots - 23y + 1$ |
| $c_3, c_7$ | $y^{10} + 2y^9 + y^8 + 2y^7 + 8y^6 - 5y^5 + 13y^4 - 7y^3 + 7y^2 - 2y + 1$ |
| $c_4, c_8$ | $y^{10} - 2y^9 + 7y^8 - 7y^7 + 13y^6 - 5y^5 + 8y^4 + 2y^3 + y^2 + 2y + 1$ |
| $c_9, c_{11}$ | $y^{10} + 10y^9 + \cdots - 2y + 1$ |
| $c_{10}$ | $y^{10} + 4y^9 + \cdots + 488y + 441$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_3^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u = -0.127642 + 1.018330I$<br>$a = -0.976414 - 0.047787I$<br>$b = -0.463656 - 0.708869I$ | $-1.78029 - 4.07054I$ | $-3.97032 + 7.89370I$ |
| $u = -0.127642 - 1.018330I$<br>$a = -0.976414 + 0.047787I$<br>$b = -0.463656 + 0.708869I$ | $-1.78029 + 4.07054I$ | $-3.97032 - 7.89370I$ |
| $u = 0.802978 + 0.812239I$<br>$a = 1.00162 + 1.89487I$<br>$b = -0.43569 - 1.47399I$ | $4.26091 - 2.70997I$ | $3.89717 + 4.51185I$ |
| $u = 0.802978 - 0.812239I$<br>$a = 1.00162 - 1.89487I$<br>$b = -0.43569 + 1.47399I$ | $4.26091 + 2.70997I$ | $3.89717 - 4.51185I$ |
| $u = 0.766035 + 0.955271I$<br>$a = -1.00445 - 2.19705I$<br>$b = -0.61139 + 1.42806I$ | $3.81810 + 8.61429I$ | $2.88207 - 9.27981I$ |
| $u = 0.766035 - 0.955271I$<br>$a = -1.00445 + 2.19705I$<br>$b = -0.61139 - 1.42806I$ | $3.81810 - 8.61429I$ | $2.88207 + 9.27981I$ |
| $u = -0.959043 + 0.878682I$<br>$a = -0.164415 - 0.151502I$<br>$b = 0.403043 - 0.198949I$ | $4.80462 - 3.47437I$ | $3.99287 + 12.44497I$ |
| $u = -0.959043 - 0.878682I$<br>$a = -0.164415 + 0.151502I$<br>$b = 0.403043 + 0.198949I$ | $4.80462 + 3.47437I$ | $3.99287 - 12.44497I$ |
| $u = 0.017671 + 0.535344I$<br>$a = 2.64366 + 0.19676I$<br>$b = 0.107691 + 1.094780I$ | $0.41119 + 3.68242I$ | $-1.80179 - 6.14716I$ |
| $u = 0.017671 - 0.535344I$<br>$a = 2.64366 - 0.19676I$<br>$b = 0.107691 - 1.094780I$ | $0.41119 - 3.68242I$ | $-1.80179 + 6.14716I$ |

## IV. $I_4^u = \langle b+1,\ a^2 - 2au - a - u - 2,\ u^2 + u + 1 \rangle$

**(i) Arc colorings**

$$a_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$
$$a_6 = \begin{pmatrix} 0 \\ u \end{pmatrix}$$
$$a_2 = \begin{pmatrix} 1 \\ u+1 \end{pmatrix}$$
$$a_3 = \begin{pmatrix} -u \\ u+1 \end{pmatrix}$$
$$a_5 = \begin{pmatrix} -u \\ u+1 \end{pmatrix}$$
$$a_7 = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$$
$$a_9 = \begin{pmatrix} a \\ -1 \end{pmatrix}$$
$$a_8 = \begin{pmatrix} u+1 \\ -au-2 \end{pmatrix}$$
$$a_{11} = \begin{pmatrix} a+1 \\ -1 \end{pmatrix}$$
$$a_4 = \begin{pmatrix} 2au+a+u+2 \\ -au-a+u \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} a+1 \\ -1 \end{pmatrix}$$
$$a_{10} = \begin{pmatrix} a+1 \\ -1 \end{pmatrix}$$

**(ii) Obstruction class** $= 1$

**(iii) Cusp Shapes** $= 9u - 3$

**(iv) u-Polynomials at the component**

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1, c_2, c_6$ | $(u^2+u+1)^2$ |
| $c_3, c_4, c_7$<br>$c_8$ | $u^4+u^3+3u^2+u+1$ |
| $c_5$ | $(u^2-u+1)^2$ |
| $c_9, c_{11}$ | $(u+1)^4$ |
| $c_{10}$ | $u^4$ |

**(v) Riley Polynomials at the component**

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_2, c_5$<br>$c_6$ | $(y^2 + y + 1)^2$ |
| $c_3, c_4, c_7$<br>$c_8$ | $y^4 + 5y^3 + 9y^2 + 5y + 1$ |
| $c_9, c_{11}$ | $(y - 1)^4$ |
| $c_{10}$ | $y^4$ |

**(vi) Complex Volumes and Cusp Shapes**

| Solutions to $I_4^u$ | $\sqrt{-1}(\mathrm{vol}+\sqrt{-1}CS)$ | Cusp shape |
|---|---|---|
| $u=-0.500000+0.866025I$<br>$a=-0.973561+0.421254I$<br>$b=-1.00000$ | $-1.64493-2.02988I$ | $-7.50000+7.79423I$ |
| $u=-0.500000+0.866025I$<br>$a=\quad 0.97356+1.31080I$<br>$b=-1.00000$ | $-1.64493-2.02988I$ | $-7.50000+7.79423I$ |
| $u=-0.500000-0.866025I$<br>$a=-0.973561-0.421254I$<br>$b=-1.00000$ | $-1.64493+2.02988I$ | $-7.50000-7.79423I$ |
| $u=-0.500000-0.866025I$<br>$a=\quad 0.97356-1.31080I$<br>$b=-1.00000$ | $-1.64493+2.02988I$ | $-7.50000-7.79423I$ |

## V. u-Polynomials

| Crossings | u-Polynomials at each crossing |
|---|---|
| $c_1$ | $((u^2+u+1)^2)(u^{10}-u^9+\cdots-u+1)$ $\cdot((u^{27}+2u^{26}+\cdots-4u^2-1)^2)(u^{36}-6u^{35}+\cdots+u+4)$ |
| $c_2, c_6$ | $((u^2+u+1)^2)(u^{10}+3u^9+\cdots+9u+1)(u^{27}+8u^{26}+\cdots-8u-1)^2$ $\cdot(u^{36}+10u^{35}+\cdots+31u+16)$ |
| $c_3, c_7$ | $(u^4+u^3+3u^2+u+1)(u^{10}+u^8+2u^7-u^5+3u^4+u^3-u^2+1)$ $\cdot(u^{36}+2u^{35}+\cdots+2u+1)(u^{54}+4u^{53}+\cdots+9u+2)$ |
| $c_4, c_8$ | $(u^4+u^3+3u^2+u+1)(u^{10}-u^8+u^7+3u^6-u^5+2u^3+u^2+1)$ $\cdot(u^{36}+6u^{34}+\cdots-5u+2)(u^{54}+2u^{53}+\cdots-1697u+407)$ |
| $c_5$ | $((u^2-u+1)^2)(u^{10}+u^9+\cdots+u+1)$ $\cdot((u^{27}+2u^{26}+\cdots-4u^2-1)^2)(u^{36}-6u^{35}+\cdots+u+4)$ |
| $c_9, c_{11}$ | $((u+1)^4)(u^{10}+2u^9+\cdots-2u+1)$ $\cdot(u^{36}+6u^{35}+\cdots+4u+1)(u^{54}-5u^{53}+\cdots-529u+44)$ |
| $c_{10}$ | $u^4(u^{10}-8u^9+\cdots-94u+21)(u^{27}-13u^{26}+\cdots-10u+4)^2$ $\cdot(u^{36}+19u^{35}+\cdots+u+2)$ |

## VI. Riley Polynomials

| Crossings | Riley Polynomials at each crossing |
|---|---|
| $c_1, c_5$ | $((y^2+y+1)^2)(y^{10}+3y^9+\cdots+9y+1)(y^{27}+8y^{26}+\cdots-8y-1)^2$ $\cdot(y^{36}+10y^{35}+\cdots+31y+16)$ |
| $c_2, c_6$ | $((y^2+y+1)^2)(y^{10}+11y^9+\cdots-23y+1)$ $\cdot((y^{27}+24y^{26}+\cdots-12y-1)^2)(y^{36}+34y^{35}+\cdots-6849y+256)$ |
| $c_3, c_7$ | $(y^4+5y^3+9y^2+5y+1)$ $\cdot(y^{10}+2y^9+y^8+2y^7+8y^6-5y^5+13y^4-7y^3+7y^2-2y+1)$ $\cdot(y^{36}+24y^{35}+\cdots+44y+1)(y^{54}-8y^{53}+\cdots+87y+4)$ |
| $c_4, c_8$ | $(y^4+5y^3+9y^2+5y+1)$ $\cdot(y^{10}-2y^9+7y^8-7y^7+13y^6-5y^5+8y^4+2y^3+y^2+2y+1)$ $\cdot(y^{36}+12y^{35}+\cdots+27y+4)$ $\cdot(y^{54}+12y^{53}+\cdots+4226411y+165649)$ |
| $c_9, c_{11}$ | $((y-1)^4)(y^{10}+10y^9+\cdots-2y+1)(y^{36}-8y^{35}+\cdots+28y+1)$ $\cdot(y^{54}+23y^{53}+\cdots+25783y+1936)$ |
| $c_{10}$ | $y^4(y^{10}+4y^9+\cdots+488y+441)(y^{27}-5y^{26}+\cdots+236y-16)^2$ $\cdot(y^{36}-y^{35}+\cdots+67y+4)$ |